REMARKS

Claims 1-24 are pending in this application. Claims 1-24 have been amended in several particulars for purposes of clarity and brevity that are unrelated to patentability and prior art rejections, in accordance with current Office policy, to further define Applicants' disclosed invention and to assist the Examiner to expedite compact prosecution of the instant application.

As a preliminary matter, Applicants respectfully request that the proposed amendment to independent claim 17 as presented in the Amendment filed on November 27, 2002 be ignored and not entered. This is because limitations in claim 17 were inadvertently presented in duplication. As a result, the proposed amendment to independent claim 17 should be ignored and not entered in favor of the currently proposed amendments to all claims 1-24 as pending in the instant application.

Claims 1-2, 9-10, and 17-18 have been rejected under 35 U.S.C. §103 as being unpatentable over Schwab, U.S. Patent No. 4,543,627, as modified to incorporate selected features from Kinoshita et al., U.S. Patent No. 6,219,583 for reasons stated on pages 2-3 of the Office Action (Paper No. 6). This rejection is respectfully traversed, however. Applicants respectfully submit that features of the present invention are not taught or suggested by Schwab '627 or Kinoshita '583, whether taken individually or in combination with any other references of record. Therefore, Applicants respectfully request the Examiner to reconsider and withdraw this rejection for the following reasons.

Independent claims 1, 9 and 17 invariably define a system, method and Beauregard tangible medium containing instructions for reading data from a remote memory of a remote device to a local memory of a local device (i.e., network device) across a network. For example, method claim 1 and network device claim 9 define a method of reading data from a remote memory of a remote device to a local memory of a local device across a network, comprising:

> sending a message from the local device to the remote device, via the network, said message including a transport header indicating a message type;
>
> determining, at the remote device, if the transport header of said message identifies the message as a remote Direct Memory Access (rDMA) read operation; and
>
> if the transport header of said message identifies the message as said remote Direct Memory Access (rDMA) read operation, then performing a remote Direct Memory Access (rDMA) write operation at the local device in accordance with data elements included in said message.

Similarly, Beauregard claim 17 defines a tangible medium storing a plurality of program instructions, which, when executed by a processor installed in a network device, causes the network device to perform the following:

> receiving a message from a remote device, via a network, said message including a transport header indicating a message type;
>
> processing said message to determine if the transport header of said message identifies the message as a remote Direct Memory Access (rDMA) read operation; and
>
> if the transport header of said message identifies that the message is said remote Direct Memory Access (rDMA) read operation, then performing a remote Direct Memory Access (rDMA) write operation in accordance with data elements included in said message.

As expressly defined in each of Applicants' independent claims 1, 9 and 17, data is exchanged between a local device and a remote device, via a network, and the data message contains a transport header used to indicate a message type, i.e., a remote Direct Memory Access (rDMA) read operation so that a remote Direct Memory Access (rDMA) write operation can be performed.

In contrast to Applicants' independent claims 1, 9 and 17, Schwab, U.S. Patent No. 4,545,627, as a primary reference, discloses a single system that contains multiple processors, also known as a multi-processor system, as shown in FIG. 1. Since there are multiple processors 300, 500, 507 shown in FIG. 1, obviously, there are multiple processor interface units 100 and 107 used to ensure that these multiple processors operate seamlessly, including sending and receiving direct data messages between the multiple processors.

However, there is **no** disclosure anywhere from Schwab '627 of Applicants' reading data from a remote memory of a remote device to a local memory of a local device, via a network, as expressly defined in each of Applicants' independent claims 1, 9 and 17. More importantly, there is **no** disclosure anywhere from Schwab '627 of Applicants' exchange of data message between a local device and a remote device, via a network, and that the data message contains a transport header used to indicate a message type, i.e., a remote Direct Memory Access (rDMA) read operation so that a remote Direct Memory Access (rDMA) write operation can be performed in the manner defined in each of Applicants' independent claims 1, 9 and 17.

As a secondary reference, Kinoshita, U.S. Patent No. 6,219,583, does **not**

remedy the noted deficiencies of Schwab '627. Specifically, Kinoshita '583 discloses a control system including a man-machine interface controller (MMC) 20 and a numerical controller (CNC) 30 interconnected with the MMC 20 by a transmission line 40 as shown in FIG. 1 and FIG. 3. The purpose is to enable the MMC 20 to make direct access to the memory 3 without any intermediate processor in the CNC 30. For example, when an access request is issued by the MMC 20 to a memory 3 in the CNC 30, the CNC 30 makes access request to the requested address by performing a direct memory access (DMA) operation to the memory 3. The CNC 30 writes the data into the memory when the access request is a write-request. On the other hand, when the access request is a read request, the CNC 30 outputs the data to the MMC 20.

Again, there is **no** disclosure or suggestion anywhere from Kinoshita '583 of Applicants' reading data from a remote memory of a remote device to a local memory of a local device, via a network, as expressly defined in each of Applicants' independent claims 1, 9 and 17. In Kinoshita '583, data is accessed between a man-machine interface controller (MMC) 20 and a numerical controller (CNC) 30 interconnected with the MMC 20 by a transmission line 40 as shown in FIG. 1 and FIG. 3.

More importantly, there is **no** disclosure or suggestion anywhere from Kinoshita '583 of Applicants' exchange of data message between a local device and a remote device, via a network, and that the data message contains a transport header used to indicate a message type, i.e., a remote Direct Memory Access (rDMA) read operation so that a remote Direct Memory Access (rDMA) write

operation can be performed in the manner defined in each of Applicants' independent claims 1, 9 and 17.

The law under 35 U.S.C. §103 is well settled. In order to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skilled in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and **not** based on Applicants' disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). See MPEP 2143. In other words, all the claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." In re Wilson, 424 F.2d 1382, 1385, 165 USQP 494, 496 (CCPA 1970).

Nevertheless, the Examiner cites column 2, lines 3-10, column 3, lines 21-22, column 4, lines 9-10, lines 21-23, column 6, lines 48-50, lines 59-62, column 7, lines 3-4, column 8, lines 2-3, and FIG. 2 of Schwab '627 for allegedly disclosing Applicants' claimed "sending a message from [a] local device to [a] remote device, via a network, said message including a transport header indicating the message type" as defined in Applicants' independent claims 1, 9 and 17.

This citation is misplaced, however. FIG. 2 shows the information flow and

program control flow for communications between two processors in a multi-processor system. FIG. 2 does **not** show communications between two (local and remote) devices across a network as alleged by the Examiner. The cited column 2, lines 3-10, column 3, lines 21-22, column 4, lines 9-10, lines 21-23, column 6, lines 48-50, lines 59-62, column 7, lines 3-4, and column 8, lines 2-3 of Schwab '627 all refer to the details of communications between two processors in a multi-processor system, and **not** between two (local and remote) devices across a network as alleged by the Examiner.

The Examiner cites column 3, lines 25-27, lines 31-36, column 6, lines 38-68, column 7, lines 40-50, and column 8, lines 1-5 of Schwab '627 for allegedly disclosing Applicants' claimed "determining whether or not the transport header ... identifies the message as a type of remote Direct Memory Access read operation" as defined in Applicants' independent claims 1, 9 and 17. In addition, the Examiner also cites column 4, lines 46-63, column 6, lines 48-68, column 7, lines 15-25, and column 8, lines 1-5 of Schwab '627 for allegedly disclosing Applicants' claimed "performing a remote Direct Memory Access operation to said local device in accordance with data elements included in the message" as defined in Applicants' independent claims 1, 9 and 17.

Again, these citations are misplaced. All the cited portions of Schwab '627 simply refer to the details of communications between two processors in a multi-processor system, and **not** between two (local and remote) devices across a network, and certainly, not performing any RDMA as alleged by the Examiner.

As previously pointed out, the Examiner has misinterpreted the teachings of

Schwab '627 and Kinoshita '583, ignored to treat Applicants' claim invention as a whole, failed to consider all the key limitations of Applicants' independent claims 1, 9 and 17, and failed to provide any suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skilled in the art, to modify Kinoshita '583 into Schwab '627 in order to arrive at Applicants' claims 1-2, 9-10, and 17-18. Therefore, in view of these reasons, Applicants respectfully request that the rejection of claims 1-2, 9-10, and 17-18 be withdrawn.

Claims 3-4, 11-12 and 19-20 have been rejected under 35 U.S.C. §103 as being unpatentable over Schwab, U.S. Patent No. 4,543,627, as modified to incorporate selected features from Kinoshita et al., U.S. Patent No. 6,219,583 and Osborne for reasons stated on pages 4-5 of the Office Action (Paper No. 6). However, this rejection is vague and ambiguous because there are two Osborne references cited in USPTO Form 892, including U.S. Patent No. 6,078,733 and U.S. Patent No. 5,909,546. Since the Examiner has not indicated which Osborne reference is used to support the rejection, Applicants cannot address the incorrectness of this rejection. Accordingly, clarification is respectfully requested.

To the extent that Osborne, whether U.S. Patent No. 6,078,733 or U.S. Patent No. 5,909,546, may still be applicable, Applicants respectfully traverse the rejection for reasons discussed against the rejection of Applicants' claims 1-2, 9-10, and 17-18 under 35 U.S.C. §103 as being unpatentable over Schwab, U.S. Patent No. 4,543,627, as modified to incorporate selected features from Kinoshita et al., U.S. Patent No. 6,219,583.

In addition, even assuming *arguendo*, that Osborne discloses what the

Examiner alleges as "source and destination buffers being registered with the Virtual Interface network interface controller" as defined in Applicants' dependent claims 3-4, 11-12 and 19-20, Applicants submit that the Examiner's proposed combination still does not arrive at Applicants' claims 3-4, 11-12 and 19-20 in the context of Applicants' base claims 1, 9 and 17. For these reasons, Applicants respectfully request that the rejection be withdrawn.

Claims 5-6, 13-14 and 21-22 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Schwab, U.S. Patent No. 4,543,627, as modified to incorporate selected features from Kinoshita et al., U.S. Patent No. 6,219,583, further in view of Osborne and Krishnan et al., U.S. Patent No. 4,922,416 for reasons stated on pages 5-6 of the Office Action (Paper No. 6). Likewise, claims 7-8, 15-16 and 23-24 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Schwab, U.S. Patent No. 4,543,627, as modified to incorporate selected features from Kinoshita et al., U.S. Patent No. 6,219,583, further in view of Osborne and Krishnan et al., U.S. Patent No. 4,922,416, and Chow et al., U.S. Patent No. 6,052,387 for reasons stated on pages 6-8 of the Office Action (Paper No. 6). Again, these rejections are also vague and ambiguous because there are two Osborne references cited in USPTO Form 892, including U.S. Patent No. 6,078,733 and U.S. Patent No. 5,909,546. Since the Examiner has not indicated which Osborne reference is used to support the rejection, Applicants cannot address the incorrectness of this rejection and request that clarification be provided.

To the extent that Osborne, whether U.S. Patent No. 6,078,733 or U.S. Patent No. 5,909,546, may still be applicable, Applicants respectfully traverse the rejection

for reasons discussed against the rejection of Applicants' claims 1-2, 9-10, and 17-18 under 35 U.S.C. §103 as being unpatentable over Schwab, U.S. Patent No. 4,543,627, as modified to incorporate selected features from Kinoshita et al., U.S. Patent No. 6,219,583.

In addition, even assuming *arguendo*, that Osborne discloses what the Examiner alleges as "source and destination buffers being registered with the Virtual Interface network interface controller" s defined in Applicants' dependent claims 3-4, 11-12 and 19-20, that Krishnan '416 discloses "a data element of the rDMA read message specifying the last data segment and completion of the rDMA read request" as defined in Applicants' dependent claims 5-6, 13-14 and 21-22, and that Chow '387 discloses what the Examiner alleges as "write descriptors with the sequence inserted into the immediate data field on the last segment of each request" as defined in Applicants' dependent claims 7-8, 15-16 and 23-24,

Applicants submit that the Examiner's proposed combination still does not arrive at Applicants' claims 3-8, 11-16 and 19-24 in the context of Applicants' base claims 1, 9 and 17. For these reasons, Applicants respectfully request that the rejection be withdrawn.

In view of the foregoing amendments, arguments and remarks, all claims are deemed to be allowable and this application is believed to be in condition to be passed to issue. Should any questions remain unresolved, the Examiner is requested to telephone Applicants' attorney at the Washington DC area office at (703) 312-6600.

INTERVIEW:

In the interest of expediting prosecution of the present application, Applicants respectfully request that an Examiner interview be scheduled and conducted. In accordance with such interview request, Applicants respectfully request that the Examiner, after review of the present Amendment, contact the undersigned local Washington, D.C. area attorney at the local Washington, D.C. telephone number (703) 312-6600 for scheduling an Examiner interview, or alternatively, refrain from issuing a further action in the above-identified application as the undersigned attorneys will be telephoning the Examiner shortly after the filing date of this Amendment in order to schedule an Examiner interview. Applicants thank the Examiner in advance for such considerations. In the event that this Amendment, in and of itself, is sufficient to place the application in condition for allowance, no Examiner interview may be necessary.

Attached hereto is a marked-up version of the changes made to the claims. The attached page is captioned "**Version with markings to show changes made**."

To the extent necessary, Applicants petition for an extension of time under 37 CFR §1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (Case No. 219.37206X00) and please credit any excess fees to such deposit account.

Respectfully submitted,

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Attachment: Version With Markings To Show Changes Made

ATTACHMENT

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

Claims 1-24 have been amended, as follows:

1. (Amended) A method of reading data from a remote memory of a remote device to a local memory of a local device across a network, said method comprising:

sending a message from ~~said~~the local device to ~~said~~the remote device, via the network, said message including a transport header indicating ~~the~~a message type ~~of said message~~;

~~processing said message, in said~~determining, at the remote device, ~~to determine whether or not~~if the transport header of said message identifies the message as a ~~type of~~ remote Direct Memory Access (rDMA) read operation; and

if ~~the remote device determines from~~ the transport header of said message identifies ~~that~~ the message ~~is~~as said ~~type of~~ remote Direct Memory Access (rDMA) read operation, then performing a remote Direct Memory Access (rDMA) write operation ~~to said~~at the local device in accordance with data elements included in said message.

2. (Amended) The method ~~recited~~as claimed in claim 1, wherein ~~said~~the data elements in said rDMA read message identify a set of source buffers in the

remote device which reference the remote ~~host-side~~ memory and a set of destination buffers in the local device that reference the local memory.

3. (Amended) The method ~~recited~~as claimed in claim 2, wherein the source buffers and destination buffers are registered with ~~the~~ a Virtual Interface (VI) network interface controller of the remote device and the local device, respectively.

4. (Amended) The method ~~recited~~as claimed in claim 3, wherein the data elements of the rDMA read message specify the source buffers and destination buffers as multiple data segments with offsets and designate a channel of the Virtual Interface (VI) as ~~the~~a data path for the rDMA write operation.

5. (Amended) The method ~~recited~~as claimed in claim 4, wherein one data element of the rDMA read message specifies ~~the~~a last data segment and completion of the rDMA read request.

6. (Amended) The method ~~recited~~as claimed in claim 5, wherein the data is read from the remote memory of the remote device directly into the local memory of the local device over ~~a virtual interface~~the Virtual Interface (VI), without making an intermediate copy of the data.

7. (Amended) The method ~~recited~~as claimed in claim 6, wherein the remote device builds virtual interface rDMA write descriptors with ~~the~~a sequence

inserted into ~~the~~an immediate data field on ~~the~~a last data segment of each rDMA read request.

8. (Amended) The method ~~recited~~as claimed in claim 7, wherein the completion of the data transfer is processed ~~in~~at the local device, based on the immediate data that arrives with the last data ~~segments~~segment of each rDMA write operation by the remote device.

9. (Amended) A network device initiating a method to read data in ~~the~~a remote memory of a remote device directly into ~~its~~a local memory, said network device having a network interface controller (NIC) configured to ~~carry out a method comprising~~perform the following:

~~sending~~receiving a message from ~~said local device to said~~the remote device, via a network, said message including a transport header indicating ~~the~~a message type ~~of said message~~;

processing said message~~, in said remote device,~~ to determine ~~whether or not~~if the transport header of said message identifies the message as a ~~type of~~ remote Direct Memory Access (rDMA) read operation; and

if the ~~remote device determines from the~~ transport header of said message ~~that~~identifies the message ~~is~~as said ~~type of~~ remote Direct Memory Access (rDMA) read operation, then performing a remote Direct Memory Access (rDMA) write operation ~~to said local device~~ in accordance with data elements included in said message.

10. (Amended) The network device ~~recited~~as claimed in claim 9, wherein ~~said~~the data elements ~~in said~~of the rDMA read message identify a set of source buffers in the remote device which reference the remote ~~host-side~~ memory and a set of destination buffers in the local device that reference the local memory.

11. (Amended) The network device ~~recited~~as claimed in claim 10, wherein the source buffers and destination buffers are registered with the ~~Virtual Interface~~ network interface controller (NIC) of the remote device and the ~~local~~network device, respectively.

12. (Amended) The network device ~~recited~~as claimed in claim 11, wherein the data elements of the rDMA read message specify the source buffers and destination buffers as multiple data segments with offsets and designate a channel of ~~the~~a Virtual Interface (VI) as ~~the~~a data path for the rDMA write operation.

13. (Amended) The network device ~~recited~~as claimed in claim 12, wherein one data element of the rDMA read message specifies a~~the~~ last data segment and completion of the rDMA read request.

14. (Amended) The network device ~~recited~~as claimed in claim 13, wherein the data is read from the remote memory of the remote device directly into

the local memory of the ~~local~~network device over ~~a virtual interface~~the Virtual Interface (VI), without making an intermediate copy of the data.

15. (Amended) The network device ~~recited~~as claimed in claim 14, wherein the remote device builds ~~virtual interface~~ rDMA write descriptors with ~~the~~a sequence inserted into ~~the~~an immediate data field on the last data segment of each rDMA read request.

16. (Amended) The network device ~~recited~~as claimed in claim 15, wherein the completion of the data transfer is processed ~~in the local device,~~ based on the immediate data that arrives with the last data ~~segments~~ segment of each rDMA write operation by the remote device.

17. (Amended) A tangible medium storing a plurality of program instructions, ~~said program instructions causing~~which, when executed by a processor installed in a network device, causes the network device to ~~carry out a method of reading data from the remote memory of a remote device directly to its local memory, said method comprising~~perform the following:

~~sending~~receiving a message from ~~said local device to said~~a remote device, via a network, said message including a transport header indicating ~~the~~a message type ~~of said message~~;

processing said message~~, in said remote device,~~ to determine ~~whether or not~~if the transport header of said message identifies the message as a ~~type of~~ remote Direct Memory Access (rDMA) read operation; and

if the ~~remote device determines from the~~ transport header of said message identifies that the message is said ~~type of~~ remote Direct Memory Access (rDMA) read operation, then performing a remote Direct Memory Access (rDMA) write operation ~~to said local device~~ in accordance with data elements included in said message.

18. (Amended) The tangible medium ~~recited~~as claimed in claim 17, wherein ~~said~~the data elements ~~in said~~of the rDMA read message identify a set of source buffers in the remote device which reference ~~the~~a remote ~~host side~~ memory and a set of destination buffers in the ~~local~~network device that reference ~~the~~a local memory.

19. (Amended) The tangible medium ~~recited~~as claimed in claim 18, wherein the source buffers and destination buffers are registered with ~~the Virtual Interface~~a network interface controller (NIC) of the remote device and the ~~local~~network device, respectively.

20. (Amended) The tangible medium ~~recited~~as claimed in claim 19, wherein the data elements of the rDMA read message specify the source buffers and

destination buffers as multiple data segments with offsets and designate a channel of ~~the~~a Virtual Interface (VI) as ~~the~~a data path for the rDMA write operation.

21. (Amended) The tangible medium ~~recited~~as claimed in claim 20, wherein one data element of the rDMA read message specifies ~~the~~a last data segment and completion of the rDMA read request.

22. (Amended) The tangible medium ~~recited~~as claimed in claim 21, wherein the data is read from the remote memory of the remote device directly into the local memory of the ~~local~~network device over a ~~virtual interface~~Virtual Interface (VI), without making an intermediate copy of the data.

23. (Amended) The tangible medium ~~recited~~as claimed in claim 22, wherein the remote device builds virtual interface rDMA write descriptors with ~~the~~a sequence inserted into ~~the~~an immediate data field on the last data segment of each rDMA read request.

24. (Amended) The tangible medium ~~recited~~ as claimed in claim 7, wherein the completion of the data transfer is processed ~~in the local device,~~ based on the immediate data that arrives with the last data ~~segments~~segment of each rDMA write operation by the remote device.